CLAIMS

Having described the preferred embodiments, the invention is now claimed to be:

1. A method for tuning a radio frequency trap having an inductive element including a dielectric former and a coaxial cable wrapped around the former, the method comprising:

inserting an effective amount of electrically conductive material into the dielectric former, the amount being effective to adjust an inductance of the inductive element to tune the radio frequency trap to a selected resonant frequency value.

2. The method as set forth in claim 1, further comprising:

electrically connecting a capacitance across the inductive element, the capacitance cooperating with the inductive element to produce an untuned resonant frequency smaller than the selected resonant frequency value.

3. The method as set forth in claim 2, wherein the inserting of an effective amount of electrically conductive material comprises:

inserting non-ferromagnetic electrically conductive material into the dielectric former until the untuned resonant frequency is increased to the selected resonant frequency value.

4. The method as set forth in claim 1, wherein the electrically conductive material is ferromagnetic, the method further comprising:

electrically connecting a capacitance across the inductive element, the capacitance cooperating with the inductive element to produce an untuned resonant frequency larger than a desired resonant frequency, the inserting including inserting ferromagnetic electrically conductive material until the untuned resonant frequency is decreased to the selected resonant frequency value.

5. The method as set forth in claim 1, wherein the inductive element includes two dielectric formers and the coaxial cable is wrapped around the two dielectric formers in oppositely directed helices to produce anti-parallel magnetic fields in the two dielectric

formers, and the inserting of an electrically conductive material into the dielectric former comprises:

inserting substantially the same amount of conductive material into each dielectric former.

6. The method as set forth in claim **1**, wherein the inductive element includes two dielectric formers and the coaxial cable is wrapped around the two dielectric formers in a balanced radio frequency butterfly trap topology, and the inserting of an electrically conductive material into the dielectric former comprises:

inserting one or more rods, each rod including electrically conductive material, into openings formed into each of the dielectric formers.

7. The method as set forth in claim **1**, wherein the inserting of an electrically conductive material into the dielectric former comprises:

fastening the radio frequency trap to a substrate using one or more fasteners that fasten to the dielectric former, the fasteners including the electrically conductive material.

8. The method as set forth in claim **7**, wherein the radio frequency trap is a balanced butterfly trap including an even number of dielectric formers and the fastening of the radio frequency trap comprises:

fastening the same number of electrically conductive fasteners to each dielectric former.

9. The method as set forth in claim **8**, further comprising:

fastening one or more other fasteners to each dielectric former, the one or more other fasteners also contributing to the securing of the radio frequency trap to the substrate, each of the other fasteners not including electrically conductive material.

10. The method as set forth in claim **8**, wherein lengths of the one or more fasteners are selected to adjust the inductance of the inductive element.

11. A radio frequency trap comprising:

one or more dielectric formers;

a cable including an inner conductor and a coaxial outer conductor, at least a portion of the cable being wrapped around the one or more dielectric formers, the coaxial outer conductor of the portion of the cable wrapped around the one or more dielectric formers defining at least one inductive element;

a capacitance connected across the at least one inductive element; and

a selected amount of electrically conductive material inserted into the one or more dielectric formers, the selected amount of electrically conductive material cooperating with the at least one inductive element and the capacitance to define a resonant circuit having a selected resonance frequency.

12. The radio frequency trap as set forth in claim **11**, wherein the one or more dielectric formers are each generally cylindrical with a corkscrew slot formed into the cylindrical surface, the wrapped cable being received by the corkscrew slot.

13. The radio frequency trap as set forth in claim **11**, wherein the selected amount of electrically conductive material is embodied in fasteners for mounting the dielectric former to a support structure.

14. An apparatus comprising:

a radio frequency trap including at least:

an even number of dielectric formers,

a coaxial cable wrapped around the dielectric formers, and

a plurality of tuning elements selectively inserted into the dielectric formers to tune the radio frequency trap to a selected resonance frequency.

15. The apparatus as set forth in claim **14**, further comprising:

a magnetic resonance imaging scanner including at least a main magnet generating a spatially uniform main magnetic field at least over a field of view, a plurality of gradient coils selectively generating magnetic field gradients at least over the field of view, and a radio frequency coil for performing at least one of exciting and detecting magnetic resonance at the selected resonance frequency in an imaging subject disposed in the field of view; wherein

the radio frequency trap is connected with the radio frequency coil of the magnetic resonance imaging scanner to provide common mode high impedance to radio frequency current flow in the radio frequency coil.

16. The apparatus as set forth in claim **14**, wherein the number of dielectric formers is two.

17. The apparatus as set forth in claim **16**, wherein the tuning elements comprise:

tuning fasteners each including a preselected amount of electrically conductive material that fasten the radio frequency trap to a substrate.

18. The apparatus as set forth in claim **17**, further comprising:

non-tuning fasteners not including electrically conductive material, the radio frequency trap being secured to the substrate by a selected number of fasteners including at least one tuning fastener and one non-tuning fastener inserted into each of the two dielectric formers.

19. The apparatus as set forth in claim **16**, wherein the radio frequency trap has the same number of tuning elements inserted into each of the two dielectric formers.

20. The apparatus as set forth in claim **14**, wherein each dielectric former is generally cylindrical with a corkscrew slot formed into the cylindrical surface, the wrapped coaxial cable being received by the corkscrew slot.

21. A radio frequency trap comprising:

one or more dielectric formers;

a cable including an inner conductor and a coaxial outer conductor, at least a portion of the cable being wrapped around the one or more dielectric formers, the coaxial outer conductor of the portion of the cable wrapped around the one or more dielectric formers defining at least one inductive element;

a capacitance connected across the at least one inductive element; and

one or more electrically conductive fasteners securing the one or more dielectric formers to a substrate wherein at least a portion of each electrically conductive fastener is disposed inside the dielectric former to which it fastens.

22. The radio frequency trap as set forth in claim 21, further including:

one or more electrically insulating fasteners securing the one or more dielectric formers to a substrate, the electrically conductive fasteners and the electrically insulating fasteners being mechanically interchangeable.